WHAT IS CLAIMED IS:

1. A device for estimating the concentration of an analyte in a biological environment, said device comprising:

(a) a body;

(b) at least two primary detectors disposed on the body, wherein each primary detector is adapted to produce a signal responsive to the concentration of the analyte in the immediate biological microenvironment; and,

(c) signal processing means in communication with each individual primary detector for receiving a signal therefrom and estimating the concentration of the analyte in the biological environment from the signals said signal processing means employing one or more predetermined algorithms, said signal processing means comprising:

(i) means for adjusting the signals from each primary detector by applying signal adjustment coefficients thereto, wherein the coefficients compensate for detector failure, detector drift or variations between the biological microenvironments occupied by each detector;

(ii) means for estimating the analyte concentration in the biological microenvironment of individual primary detectors; and

(iii) means for estimating the concentration of the analyte by mathematical calculation of a primary composite signal indicative of said analyte concentration.

2. A device for estimating the concentration of an analyte in a biological environment, said device comprising:

(a) a body;

(b) at least two primary detectors disposed on the body, wherein each primary detector is adapted to produce a signal responsive to the concentration of the analyte in the immediate biological microenvironment; and,

(c) signal processing means in communication with each individual primary detector for receiving a signal therefrom and estimating the concentration of the analyte in the biological environment from the signals said signal processing means employing one or more predetermined algorithms, said signal processing means comprising:

(i) means for estimating the analyte concentration in the biological microenvironment of individual primary detectors;

(ii) means for adjusting the analyte concentration estimates by applying signal adjustment coefficients thereto, wherein the coefficients compensate for detector failure, detector drift or variations between the biological microenvironments occupied by each detector; and,

(iii) means for estimating the concentration of the analyte by mathematical calculation of a primary composite signal indicative of said analyte concentration.

3. The device according to Claims 1 or 2, further comprising at least one secondary detector disposed on the body, wherein each secondary detector is adapted to produce a signal responsive to one or more

confounding phenomena in the biological microenvironment occupied by at least one primary detector.

4. The device according to Claim 3, further comprising signal processing means in communication with each individual secondary detector for receiving a signal responsive to the presence of a confounding phenomenon in the biological microenvironment occupied by at least one primary detector.

5. The device according to Claim 4, further comprising signal processing means in communication with each individual secondary detector for receiving a signal responsive to the magnitude of a confounding phenomenon in the biological microenvironment occupied by the secondary detector.

6. The device according to Claim 5, further comprising means for producing at least one secondary composite signal by adjusting detector signals from each secondary detector by applying signal adjustment coefficients thereto, wherein the coefficients have been selected to compensate for detector failure, detector drift, variations between biological microenvironments occupied by each secondary detector, and similarities between biological microenvironments occupied by secondary detectors and primary detectors with which they may be associated.

7. The device according to Claims 1 or 2, further comprising means for calibrating the signal adjustment coefficients.

8. The device according to Claims 1 or 2, wherein the means for adjusting applies weighting factors to determine the primary composite signal.

9. The device according to Claims 1 or 2, wherein the means for adjusting applies temporal factors to determine the primary composite signal.

10. The device according to Claim 5, wherein the means for adjusting applies weighting factors to determine a secondary composite signal.

11. The device according to Claim 5, wherein the means for adjusting applies temporal factors to determine a secondary composite signal.

12. The device according to Claims 1 or 2, wherein the biological environment comprises human tissue.

13. The device according to Claims 1 or 2, wherein the analyte is glucose.

14. The device according to Claims 1 or 2, wherein the primary detector incorporates glucose oxidase.

15. The device according to Claim 3, wherein at least one confounding phenomenon comprises a concentration of a substance other than the analyte.

16. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the concentration of oxygen.

17. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the rate of perfusion of biological fluid.

18. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the rate of flow of biological fluid perfusing the biological environment.

19. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the temperature.

20. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the heart rate.

21. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the respiratory rate.

22. The device according to Claim 15, wherein the at least one confounding phenomenon comprises the physical activity level.

23. The device according to Claim 15, wherein the at least one confounding phenomenon comprises muscular activity.

24. The device according to Claims 1or 2, wherein the detector areas of adjacent detectors do not overlap.

25. The device according to Claims 1 or 2, wherein each effective detector radius is between 20 μm and 200μm.

26. The device according to Claims 1 or 2, wherein the means for estimating the concentration of an analyte comprises utilizing detector signals, signal adjustment coefficients, and at least one predetermined formula to calculate a value of analyte concentration representative of the biological environment.

27. The device according to Claims 1 or 2, wherein the signal processing means utilizes predetermined algorithms including adjustment of detector signals according to weighting factors.

28. The device according to Claims 1 or 2, wherein the signal processing means utilizes predetermined algorithms including adjustment of detector signals according to temporal factors.

29. A device for estimating the concentration of an analyte in a biological environment, said device comprising:

(a) a body;

(b) at least one primary detector disposed on the body, wherein each primary detector is adapted to produce a signal responsive to the concentration of the analyte in the immediate biological microenvironment;

(c) a plurality of secondary detectors disposed on the body, wherein each secondary detector is adapted to produce a signal responsive to one or more confounding phenomena in the biological microenvironment of at least one primary detector; and,

(d) signal processing means in communication with each individual detector for receiving a signal therefrom, said signal processing means comprising:

(i) means for adjusting the signals from each secondary detector by applying signal adjustment coefficients thereto, wherein the coefficients compensate for detector failure, detector drift, variations between the biological microenvironments occupied by each detector, and confounding phenomena; and,

(ii) means for estimating the analyte concentration in the biological microenvironment of each individual primary detector; and

(iii) means for adjusting the estimated analyte concentration associated with each primary detector by applying signal adjustment coefficients thereto, wherein the coefficients compensate for detector failure, detector drift, variations between the biological microenvironments occupied by each detector, and confounding phenomena; and

(iv) means for estimating the concentration of the analyte by mathematical calculation of a primary composite signal indicative of said analyte concentration.

30. The device according to Claim 29, further comprising means for calibrating the signal adjustment coefficients.

31. The device according to Claim 29, wherein the means for adjusting the estimated analyte concentration associated with each primary detector applies weighting factors to determine the primary composite signal.

32. The device according to Claim 29, wherein the means for adjusting the estimated analyte concentration associated with each primary detector applies temporal factors to determine the primary composite signal.

33. The device according to Claim 29, wherein the means for adjusting the signals from each secondary detector applies weighting factors to determine the secondary composite signal.

34. The device according to Claim 29, wherein the means for adjusting the signals from each secondary detector applies temporal factors to determine the secondary composite signal.

35. The device according to Claim 29, wherein the biological environment comprises human tissue.

36. The device according to Claim 29, wherein the analyte is glucose.

37. The device according to Claim 29, wherein the primary detector incorporates glucose oxidase.

38. The device according to Claim 29, wherein at least one confounding phenomenon comprises a concentration of a substance other than the analyte.

39. The device according to Claim 38, wherein the at least one confounding phenomenon comprises the concentration of oxygen.

40. The device according to Claim 29, wherein the at least one confounding phenomenon comprises the rate of perfusion of biological fluid.

41. The device according to Claim 29, wherein the at least one confounding phenomenon comprises the rate of flow of biological fluid perfusing the biological environment.

42. The device according to Claim 29, wherein the at least one confounding phenomenon comprises the temperature.

43. The device according to Claim 29, wherein the at least one confounding phenomenon comprises the heart rate.

44. The device according to Claim 29, wherein the at least one confounding phenomenon comprises the respiratory rate.

45. The device according to Claim 29, wherein the at least one confounding phenomenon comprises the physical activity level.

46. The device according to Claim 29, wherein the at least one confounding phenomenon comprises muscular activity.

47. The device according to Claim 29, wherein the detector areas of adjacent detectors do not overlap.

48. The device according to Claim 29, wherein each effective detector radius is between 20 μm and 200μm.

49. The device according to Claim 29, wherein the means for estimating the concentration of an analyte comprises utilizing detector signals, signal adjustment coefficients, and at least one predetermined formula to calculate a value of analyte concentration representative of the biological environment.

50. The device according to Claim 29, wherein the signal processing means utilizes predetermined algorithms including adjustment of detector signals according to weighting factors.

51. The device according to Claim 29, wherein the signal processing means utilizes predetermined algorithms including adjustment of detector signals according to temporal factors.

52. A method for estimating the concentration of an analyte in a biological environment, the method comprising reading a primary composite signal

indicative of the analyte concentration from a display in communication with signal processing means in a device according to Claim 1, Claim 2 or Claim 29.

53. The method according to Claim 52, wherein the device is implanted in a human tissue.

54. A method for calibrating the device of Claim 1, Claim 2 or Claim 29, the method comprising adjusting one or more detector signals obtained from the device to zero in the absence of external stimuli.

55. A method for calibrating the device of Claim 1, Claim 2 or Claim 29, the method comprising adjusting one or more detector signals obtained from the device to reflect the signal expected in response to a known stimulus.